REMARKS

Status of the Claims

Claims 1, 5, 14, and 24 – 42 are pending. Claims 2 – 4, 6 – 13, 15 – 23, and 41 are canceled. No claims have been withdrawn from consideration.

Regarding the term "foam"

Previous Office actions cited a general dictionary definition of the term "foam." Previous Office actions also provided an unsupported definition of the term "foam" that was written only to support the rejections. Applicants asserted, and respectfully reassert that exemplary definitions and unsupported definitions, written only to support the present rejection, are not appropriate. The definition of the term "foam" is provided in the specification at page 1, lines 9 – 14, and should be used. Applicants in no way suggested that the Examiner is bound by the improper definitions set forth in the previous Office actions. MPEP §2111.01 explains, "[w]hen a patentee acts as his own lexicographer in redefining the meaning of particular claim terms away from their ordinary meaning, he must clearly express that intent in the written description." The specification does not define the term "foam" away from its ordinary meaning in the art to which the invention pertains. Even if the specification is deemed to define the term "foam" away from its ordinary meaning, the first and second paragraphs of the specification indicate a clear intention to define both the invention and the term "foam." Thus, no basis exists to refuse to accept the definition of the term "foam" provided in the specification at page 1, lines 9 – 14.

Claim Amendments

The claim amendments are made without prejudice, and without disclaimer of the canceled and/or modified subject matter. Indeed, "[t]he language in the … claims may not capture every nuance of the invention or describe with complete precision the range

of its novelty."[1] Thus, "[t]he scope of [the present claims] is not limited to [their] literal terms but instead embraces all equivalents to the claims described."[2]

The amendment to claim 1 does not add new matter. The addition of the phrase, "wherein cells are distributed across the entire bulk of the foam, and wherein the envelope density of the foam is lower than the envelope density of the high-temperature-resistant thermoplastic alone" is supported in the specification on page 1, lines 9 to 14. For the reasons discussed above, the amendment to claim 1 merely makes explicit what had been implicit in the claim, and is, therefore, not made for a substantial reason related to patentability.

The cancellation of claim 41 does not add new matter, because the amendment does not change the scope of any pending claim.

New claim 42 does not add new matter, because the claim is supported in the specification on page 6, lines 1 to 10, page 6, lines 12 to 20, and page 6, lines 22, 23. Page 6, lines 1 to 10 of the specification states,

> Another embodiment of the present invention provides a process for producing an open-cell foam, by melting a thermoplastic or a mixture comprising a thermoplastic, giving a melt, mixing the melt with at least one blowing agent under pressure, and foaming the melt comprising the blowing agent by extrusion into the open atmosphere, which comprises using a foaming plastic which comprises a pulverulent solid which acts as cell-opener, and comprises carrying out the foaming at a melt temperature which is higher, by from 2 to 12°C, preferably from 2 to 10°C, particularly preferably form 2 to 8°C, than the temperature at which a closed-cell foam is formed (variant B).

Page 6, lines 12 to 20 of the specification states,

> Another embodiment of the present invention provides a process for producing an open-cell foam, by melting a thermoplastic or a mixture comprising a thermoplastic, giving a melt, mixing the melt with at least one blowing agent under pressure, and foaming the melt comprising the blowing agent by extrusion into the open atmosphere, which comprises using a foaming plastic which comprises a foreign polymer which acts as cell-opener, and which permits the product of the open-cell foam at

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[1] *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., Ltd.*, 535 U.S. 722, 731, 122 S.Ct. 1831, 1837 (2002).
[2] *Festo*, 535 U.S. at 731, 122 S.Ct. at 1837.

> foaming temperatures at which a closed-cell foam would otherwise be produced (variant C).

Page 6, lines 22, 23, which explains, "[i]t is also possible to produce open-cell foams by combining the abovementioned processes."

Claim Rejections

I. The Office action rejects claims 1, 5, 24 – 41 under 35 U.S.C §102(b) over US 6,045,899 to Wang et al. (hereinafter, "Wang").

Claim 1 and the claims that depend therefrom relate to a foam. Wang does not disclose a foam. Wang is directed to a membrane. Anticipation requires a single prior art reference to describe every aspect of the claimed subject matter.[3] Therefore, Wang does not anticipate the claimed invention.

Furthermore, claim 1 and the claims that depend therefrom are directed to a foam, having an open-cell structure, wherein the open-cell factor for the foam is at least 75%, and wherein the foam has a cell size of from 50 to 2000 μm. The Wang membrane is not disclosed as having an open-cell structure. The Wang membrane is not disclosed as having an open-cell factor of at least 75%. The Wang membrane is not disclosed as having a cell-size of from 50 to 2000 μm. Even though the Wang membranes have pores, the pores are not required to be open, and Wang does not give an open cell factor. The pores in the Wang membrane are due to the casting process, and are not uniformly distributed. At column 5, lines 26 – 38, Wang explains, the pore size regularly increases throughout the structure of the membrane, and a highly asymmetric membrane is obtained.

The Office action's assertion that an open-cell structure, an open-cell factor of at least 75%, and a cell size of from 50 to 2000 μm "can be ascertained with particularity from the figures of Wang…"[4] is not supported by concrete evidence in the record. The

[3] See *Schering Corp. v. Geneva Pharms., Inc.*, 339 F.3d 1373, 1379 (Fed. Cir. 2003); *Continental Can Co. USA v. Monsanto Co.*, 948 F.2d 1264, 1267-69 (Fed. Cir. 1991).
[4] Page 5, line 22 – page 6, line 1 of the Office action mailed April 30, 2008.

Office action does not ascertain these features from the figures of Wang at all, let alone with particularity. Thus, the Office action has improperly taken Official Notice. Specifically, the Office action has taken Official Notice that an open-cell factor can be ascertained with particularity from an electron micrograph of a membrane. Applicants request that the Official Notice assertion be withdrawn. Alternatively, according to the case of *In re Zurko*, 258 F.3d 1379, 1386, 59 USPQ2d 1693, 1697 (Fed. Cir. 2001), "[The examiner] must point to some concrete evidence in the record in support of these findings."

New claim 42 is relates to a foam. Wang does not disclose a foam, therefore, Wang does not anticipate new claim 42. More specifically, new claim 42 relates to a foam obtained by extruding a melt comprising a high-temperature-resistant thermoplastic selected from the group consisting of polyether sulfones, polysulfones, polyethersulfonamides, and combinations thereof, at least one blowing agent, and a foaming plastic comprising a cell-opener selected from the group consisting of a pulverulent solid, a foreign polymer, and combinations thereof, into the open atmosphere at a temperature higher by from 2 to 12°C than the temperature at which a closed-cell foam is formed. The foam according to claim 42, therefore has an open-cell structure. As discussed above, Wang's membrane is not disclosed as having an open-cell structure. Furthermore, the foam according to claim 42 comprises a cell-opener. Wang's membrane is not disclosed as comprising a cell-opener.

A person having ordinary skill in the art would appreciate the distinctions between a foam and a membrane. A foam is usually obtained by foaming, whereas a membrane is usually obtained by casting. The membranes according to Wang are prepared by a "phase inversion" process as described at column 5, line 65 – column 6, line 7, the process comprises a first step in which a casting dope is provided. The casting dope comprises a sulfone polymer and a hydrophilic polymer, dissolved in a solvent. In the next step the dope is cast to form a thin film. The thin film is exposed to a gaseous environment, including water vapor at a relative humidity of between about 50% and 80% for between about 2 seconds and 20 seconds. The film is then coagulated in a water bath having a temperature between about 20°C and 70°C. Finally, the membrane is recovered from the water bath.

II. The Office action rejects claims 1, 5, 14, 24 – 41 under 35 U.S.C §102(e) over US 7,045,082 to Dietzen et al. (hereinafter, "Dietzen"), or under 35 U.S.C §102(a) over Dietzen, or under 35 U.S.C §103(a) over EP 1333051 which allegedly corresponds to Dietzen.

Dietzen discloses a process for producing foam webs from a polysulfone or a polyethersulfone by extruding a mixture of the thermoplastic with from 1 to 10% by weight of a volatile blowing agent, under pressure into the open atmosphere. The blowing agent used according to Dietzen is a very specific blowing agent. According to paragraph [0004], the Dietzen blowing agent is water or a mixture of water with up to 200 parts by weight, based on 100 parts by weight of water, of an inert gas or organic liquid.

In Examples 1 and 2, Dietzen describes a process for the preparation of a foam web, wherein ULTRASON® E2010 is used as polyethersulfone. The blowing agent is injected into the melt having a temperature of 340°C. The foaming temperatures are mentioned in paragraph [0019]. The temperatures used in example 1 of Dietzen for foaming polyether sulfone are selected to obtain a foam comprising mainly <u>closed cells</u>. To illustrate this point, it is useful to compare the temperatures used in Dietzen to foam polyether sulfone with the temperatures used in the present specification to obtain a foam according to the present invention, i.e., a polyether sulfone foam having an open-cell structure, wherein the open-cell factor for the foam is at least 75%. Page 13, lines 20 to 30 of the present specification provide the details of three experiments conducted with polyether sulfone 3010E from BASF. The results are represented below:

Exp. No.	H_2O (%)	Acetone (%)	Talc (%)	T (°C)	Thickness (mm)	Density (g/l)	Open-cell factor (%)
1*	1.2	4	0.1	249.1	30	43	6
2	1.2	4	0.1	258.3	25	53	78
3	1.8	4	0.1	259.2	28	46	93

* Experiment 1 is non-inventive, since the melt temperature selected here during foaming was one at which a closed-cell foam is produced (temperature difference between experiment 1 and experiments 2 and 3 approximately 10°C).

As can be seen from experiment 1, at foaming tempertures of 249.1°C, a closed cell-foam is produced from polyether sulfone E3010 from BASF. Only at higher temperatures, is a foam according the present invention produced from the polyether sulfone, i.e., a polyether sulfone foam having an open-cell structure, wherein the open-cell factor for the foam is at least 75%. The temperature ranges utilized in example 1 of Dietzen for foaming polyether sulfone E2010 from BASF are from 243.8°C to 250°C. As expressed by Dr. Dietrich Scherzer in the enclosed Expert Declaration under 37 C.F.R. §1.132, the temperature behavior of the two polyethersulfones used in Dietzen (ULTRASON®), respectively used in example 1 of the present invention (polyethersulfone 3010 E) show a comparable temperature behavior. Since the foaming temperatures in example 1 of Dietzen are not sufficiently high to obtain foams having a high open-cell factor, Dietzen does not disclose foams having an open-cell factor of at least 75%. For at least these reasons, applicants respectfully submit that the claimed invention is neither anticipated by nor obvious over Dietzen.

The Office action criticizes the Declaration of Dr. Scherzer, because of paragraph (7), which states "[t]he melting temperature and the melting behavior of ULTRASON® 2010 and polyether sulfone 3010E are comparable." The Office action states, "comparable" is not sufficient for a direct comparison and presented the Office Action data sheets of ULTRASON® <u>S</u> 2010 PSU and ULTRASON® <u>S</u> 3010 PSU, wherein the melting temperature for ULTRASON® <u>S</u> 2010 is 350°C and the melting temperature for ULTRASON® <u>S</u> 3010 is 360°C. Applicants respectfully submit that ULTRASON® <u>S</u> is a <u>polysulfone</u> sold by BASF SE.

On the other hand, Dietzen, particularly in Example 1, employs a poly<u>ether</u>sulfone. Example 1 of the present invention also employs a poly<u>ether</u>sulfone. More specifically, the polyethersulfone according to Dietzen is ULTRASON® <u>E</u> 2010, and the polyethersulfone according to example 1 of the present invention is ULTRASON® <u>E</u> 3010. As can be seen from the enclosed product information sheets for ULTRASON® <u>E</u> 2010 and ULTRASON® <u>E</u> 3010, the melt temperatures of both compounds are comparable as mentioned in the declaration of Dr. Scherzer.

Furthermore, with respect to new claim 42, which requires the use of a cell-opener

selected from the group consisting of a pulverulent solid, a foreign polymer, and combinations thereof, applicants respectfully submit Dietzen does not employ a cell-opener. Applicants respectfully submit that the foam obtained according to Dietzen is, therefore, clearly different from the foam according to new claim 42. The produced according to new claim 42 comprises a pulverulent solid and/or a foreign polymer, whereas the foam according to Dietzen does not comprises any such further substances. For at least these reasons, applicants respectfully submit that the invention according to new claim 42 is neither anticipated by nor obvious over Dietzen.

Fee Authorization

Please charge any shortage in fees due in connection with the filing of this paper, including any shortage in Extension of Time fees, to Deposit Account 14.1437. Please credit any excess fees to such account.

Conclusion

The present application is in condition for allowance, and applicants respectfully request favorable action. In order to facilitate the resolution of any questions, the Examiner is welcome to contact the undersigned by phone.

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Respectfully submitted,
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Enclosures (2):
- Product Information, ULTRASON ® E 2010 natural (PES), BASF The Chemical Company, July 2004, and
- Product Information, ULTRASON ® E 3010 natural (PES), BASF The Chemical Company, July 2004.

Product Information

July 2004

Ultrason® E 2010 natural (PES)

BASF The Chemical Company

Product description

Unreinforced, medium viscosity standard injection moulding grade.
Abbreviated designation according to ISO 1043-1: PESU

Physical form and storage

Ultrason pellets are supplied in 25 kg bags and octabins. The bulk density ranges between 700 and 800 g/l. Provided the packaging remains undamaged, Ultrason can be stored indefinitely. Ultrason pellets absorb moisture very rapidly. Therefore, the pellets need to be dried at least 4h at 130 °C to 150 °C in a vacuum or dry air drier prior to processing.

Product safety

From our experience and information, proper treatment and reasonable use of the product will not have any health hazardous effects.
In view of the high temperatures involved in processing Ultrason, great care must be exercised - even more than for other thermoplastics- in handling the machinery, molds, moldings and residual melts. If there are concerns or doubts on the thermal capacity and limits, the machinery manufacturer should be consulted.
Any product that has decomposed during injection molding must be removed from the barrel by injection into the atmosphere and simultaneous reduction of the barrel temperature. Noxious odors that could form during this procedure can be reduced by rapid cooling of the degraded material, e.g. in a water bath. If the degraded material is not pumped out of the barrel, gas pressure may build up, particularly if nozzle shutoff devices are used. The built-up pressure could then release violently into the vicinity of the nozzle or hopper and explosions would therefore be expected in the course of pumping.
If the normal precautions are taken and the upper temperature limit, i.e. 390 °C, is not exceeded, no health hazardous vapors are formed while Ultrason is being processed. In common with all other thermoplastics, Ultrason decomposes on exposure to excessive heat, for instance if the melt temperature is too high and/or the residence time in the plasticizing unit is too long or if residues are burned off during cleaning of the machinery. The figures laid down for the maximum allowable dust concentrations (e.g. MAK value in Germany) must be met in further processing.
The work place must be well ventilated, preferably by means of an exhaust system installed above the barrel unit. Irrespective of this, all precautions relating to accident prevention must strictly be taken. Under no circumstances may the plasticizing units be dismantled after a breakdown while they are still hot.

Note

BASF Aktiengesellschaft
67056 Ludwigshafen, Germany

BASF
The Chemical Company

Ultrason® E 2010 natural

Typical values at 23 °C (73 °F) [1]	Test method	Unit	Condition	Values
Properties				
Symbol	ISO 1043	-	-	PES
Density	ISO 1183	g/cm³	-	1.37
Viscosity number (in 0,01g/ml Phenol/ortho-Dichlorobenzene, 1:1)	ISO 307	ml/g	-	56
Colors: natural (n), colored (c), black (bk)	-	-	-	n,c,bk
Water absorption, saturation in water at 23°C (73°F)	ISO 62	%	-	2.10
Water absorption, saturation in air at 23°C (73°F)/50% r.h.	ISO 62	%	-	0.80
Processing				
Method: Injection molding (M), Extrusion (E), Film extrusion (F), Blow molding (B)	-	-	-	M,F,B,(E)
Melt volume rate MVR 360 °C /10 kg (680 °F/22.05 lbs)	ISO 1133	cm³/10 min	-	77
Melt temperature range, injection molding/extrusion	-	°C	-	340 - 390
Mold temperature range, injection molding	-	°C	-	140 - 170
Molding shrinkage, free, longitudinal/transverse [2]	-	%	-	0.62 / 0.73
Molding shrinkage, restricted, longitudinal/transverse [3]	-	%	-	0.71 / 0.67
Flammability				
Flammability according to UL-Standard at d = 0,8 mm thickness	UL 94	class	-	V-1
Flammability according to UL-Standard at d = 1,6 mm thickness	UL 94	class	-	V-0
Flammability according to UL-Standard at d = 3,2 mm thickness	UL 94	class	-	V-0
Mechanical properties				
Tensile modulus of elasticity	ISO 527-2	MPa	cond.	2700
Yield stress (v = 50 mm/min), Stress at break (v = 5 mm/min)*	ISO 527-2	MPa	cond.	90
Yield strain (v = 50 mm/min)	ISO 527-2	%	cond.	6.7
Nominal strain at break, Strain at break*	ISO 527-2	%	cond.	40
Tensile creep modulus, 1000 h, elongation ≤ 0.5%, +23°C (73°F)	ISO 899-1	MPa	cond.	2700
Charpy impact strength [4] +23°C(73°F)/-30°C(-22°F)	ISO 179/1eU	kJ/m²	cond.	N / N
Charpy notched impact strength +23°C(73°F)/-30°C(-22°F)	ISO 179/1eA	kJ/m²	cond.	7.0 / 7.0
Izod notched impact strength 1A +23°C(73°F)/-30°C(-22°F)	ISO 180/1A	kJ/m²	cond.	7.0 / 7.0
Ball indentation hardness H 358/30, H 961/30*	ISO 2039-1	MPa	dry	150
Thermal properties				
Heat deflection temp. under 0.45 MPa load (HDT B)	ISO 75-2	°C	-	218
Max. service temperature, up to a few hours [5]	-	°C	-	220
Temp. index for 50% loss of tensile strength after 20000h [6]	UL 746-B	°C	-	180
Therm. coefficient of linear expansion, longitud. 23-80°C (73-176°F)	DIN 53752	10^{-4}/K	-	0.55
Therm. coeff. of linear expansion, longitud. 140°C (284°F), 180°C (356°F)*	DIN 53752	10^{-4}/K	-	0.59*
Dielectric properties				
Dielectric constant at 100 Hz/ 1 MHz	IEC 60250	-	cond.	3.9 / 3.8
Dissipation factor at 100 Hz/ 1 MHz	IEC 60250	10^{-4}	cond.	17 / 140
Volume resistivity	IEC 60093	Ω · m	cond.	$>10^{14}$
Surface resistivity	IEC 60093	Ω	cond.	$>10^{14}$
Dielectric strength K20/K20	IEC 60243-1	kV/mm	cond.	35
Comparative tracking index CTI, test solution A	IEC 60112	-	cond.	100
Comparative tracking index CTI M, test solution B	IEC 60112	-	cond.	100
Optical properties				
Refractive index (specimen thickness = 1mm)	ISO 489	-	-	1.650
Light transmission (specimen thickness = 2mm)	ASTM D 1003	%	-	80
Molecular weight				
Mw (light scattering in NMP)	-	g/mol	-	
Mw/Mn (GPC in DMF) [7]	-	-	-	

Footnotes
1) for uncolored product, unless defined otherwise in the product name
2) Plate with film gate, dimensions: 110*110*2mm³.
3) Test box with central gating, base dimensions: 107*47*1,5mm³, longitud.= length of base, transv.= width of base.
4) N = not broken.
5) empirical values for parts repeatedly exposed to this temperature for several hours at a time over a period of years, provided that shaping and processing were in accord to the material.
6) In part expected values
7) Reference material; poly(ethylene oxide)/ polyethylene glycol.

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67056 Ludwigshafen, Germany

Product Information

July 2004

Ultrason® E 3010 natural (PES)

BASF The Chemical Company

Product description

Unreinforced, higher viscosity injection moulding and extrusion grade, tougher and with improved chemical resistance.
Abbreviated designation according to ISO 1043-1: PESU

Physical form and storage

Ultrason pellets are supplied in 25 kg bags and octabins. The bulk density ranges between 700 and 800 g/l. Provided the packaging remains undamaged, Ultrason can be stored indefinitely. Ultrason pellets absorb moisture very rapidly. Therefore, the pellets need to be dried at least 4h at 130 °C to 150 °C in a vacuum or dry air drier prior to processing.

Product safety

From our experience and information, proper treatment and reasonable use of the product will not have any health hazardous effects.
In view of the high temperatures involved in processing Ultrason, great care must be exercised - even more than for other thermoplastics- in handling the machinery, molds, moldings and residual melts. If there are concerns or doubts on the thermal capacity and limits, the machinery manufacturer should be consulted.
Any product that has decomposed during injection molding must be removed from the barrel by injection into the atmosphere and simultaneous reduction of the barrel temperature. Noxious odors that could form during this procedure can be reduced by rapid cooling of the degraded material, e.g. in a water bath. If the degraded material is not pumped out of the barrel, gas pressure may build up, particularly if nozzle shutoff devices are used. The built-up pressure could then release violently into the vicinity of the nozzle or hopper and explosions would therefore be expected in the course of pumping.
If the normal precautions are taken and the upper temperature limit, i.e. 390 °C, is not exceeded, no health hazardous vapors are formed while Ultrason is being processed. In common with all other thermoplastics, Ultrason decomposes on exposure to excessive heat, for instance if the melt temperature is too high and/or the residence time in the plasticizing unit is too long or if residues are burned off during cleaning of the machinery. The figures laid down for the maximum allowable dust concentrations (e.g. MAK value in Germany) must be met in further processing.
The work place must be well ventilated, preferably by means of an exhaust system installed above the barrel unit. Irrespective of this, all precautions relating to accident prevention must strictly be taken. Under no circumstances may the plasticizing units be dismantled after a breakdown while they are still hot.

Note

The information submitted in this publication is based on our current knowledge and experience. In view of the many factors that may affect processing and application, these data do not relieve processors of the responsibility of carrying out their own tests and experiments; neither do they imply any legally binding assurance of certain properties or of suitability for a specific purpose. It is the responsibility of those to whom we supply our products to ensure that any proprietary rights and existing laws and legislation are observed. In order to check the availability of products please contact us or our sales agency.

BASF Aktiengesellschaft
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BASF
The Chemical Company

Ultrason® E 3010 natural

Typical values at 23 °C (73 °F) 1)	Test method	Unit	Condition	Values
Properties				
Symbol	ISO 1043	-	-	PES
Density	ISO 1183	g/cm³	-	1.37
Viscosity number (in 0,01g/ml Phenol/ortho-Dichlorobenzene, 1:1)	ISO 307	ml/g	-	66
Colors: natural (n), colored (c), black (bk)	-	-	-	n
Water absorption, saturation in water at 23°C (73°F)	ISO 62	%	-	2.10
Water absorption, saturation in air at 23°C (73°F)/50% r.h.	ISO 62	%	-	0.80
Processing				
Method: Injection molding (M), Extrusion (E), Film extrusion (F), Blow molding (B)	-	-	-	M,E,F,B
Melt volume rate MVR 360 °C /10 kg (680 °F/22.05 lbs)	ISO 1133	cm³/10 min	-	40
Melt temperature range, injection molding/extrusion	-	°C	-	350 - 390
Mold temperature range, injection molding	-	°C	-	140 - 170
Molding shrinkage, free, longitudinal/transverse 2)	-	%	-	0.73 / 0.83
Molding shrinkage, restricted, longitudinal/transverse 3)	-	%	-	0.75 / 0.91
Flammability				
Flammability according to UL-Standard at d = 0,8 mm thickness	UL 94	class	-	V-1
Flammability according to UL-Standard at d = 1,6 mm thickness	UL 94	class	-	V-0
Flammability according to UL-Standard at d = 3,2 mm thickness	UL 94	class	-	V-0
Mechanical properties				
Tensile modulus of elasticity	ISO 527-2	MPa	cond.	2700
Yield stress (v = 50 mm/min), Stress at break (v = 5 mm/min)*	ISO 527-2	MPa	cond.	90
Yield strain (v = 50 mm/min)	ISO 527-2	%	cond.	6.7
Nominal strain at break, Strain at break*	ISO 527-2	%	cond.	40
Tensile creep modulus, 1000 h, elongation ≤ 0,5%, +23°C (73°F)	ISO 899-1	MPa	cond.	2700
Charpy impact strength 4) +23°C(73°F)/-30°C(-22°F)	ISO 179/1eU	kJ/m²	cond.	N / N
Charpy notched impact strength +23°C(73°F)/-30°C(-22°F)	ISO 179/1eA	kJ/m²	cond.	7.5 / 7.5
Izod notched impact strength 1A +23°C(73°F)/-30°C(-22°F)	ISO 180/1A	kJ/m²	cond.	7.5 / 7.5
Ball indentation hardness H 358/30, H 961/30*	ISO 2039-1	MPa	dry	150
Thermal properties				
Heat deflection temp. under 0.45 MPa load (HDT B)	ISO 75-2	°C	-	218
Max. service temperature, up to a few hours 5)	-	°C	-	220
Temp. index for 50% loss of tensile strength after 20000h 5)	UL 746-B	°C	-	180
Therm. coefficient of linear expansion, longitud. 23-80°C (73-176°F)	DIN 53752	10^{-4}K	-	0.55
Therm. coeff. of linear expansion, longitud. 140°C (284°F), 180°C (356°F)*	DIN 53752	10^{-4}/K	-	0.59*
Dielectric properties				
Dielectric constant at 100 Hz/ 1 MHz	IEC 60250	-	cond.	3.9 / 3.8
Dissipation factor at 100 Hz/ 1 MHz	IEC 60250	10^{-4}	cond.	17 / 140
Volume resistivity	IEC 60093	Ω · m	cond.	>10^{15}
Surface resistivity	IEC 60093	Ω	cond.	>10^{14}
Dielectric strength K20/K20	IEC 60243-1	kV/mm	cond.	38
Comparative tracking index CTI, test solution A	IEC 60112	-	cond.	100
Comparative tracking index CTI M, test solution B	IEC 60112	-	cond.	100
Optical properties				
Refractive index (specimen thickness = 1mm)	ISO 489	-	-	1.650
Light transmission (specimen thickness = 2mm)	ASTM D 1003	%	-	80
Molecular Weight				
Mw (light scattering in NMP)	-	g/mol	-	
Mw/Mn (GPC in DMF) 7)	-	-	-	

Footnotes:
1) for uncolored product, unless defined otherwise in the product name
2) Plate with film gate, dimensions: 110*110*2mm³.
3) Test box with central gating, base dimensions: 107*47*1,5mm³. longitud.= length of base, transv.= width of base
4) N = not broken.
5) empirical values for parts repeatedly exposed to this temperature for several hours at a time over a period of years, provided that shaping and processing were in accord to the material.
6) In part expected values
7) Reference material: poly(ethylene oxide)/ polyethylene glycol.

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